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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/632,347	08/01/2003	William R. McGrath	50679/RAG/C766	3598

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EXAMINER	
FLORY, CHRISTOPHER A	
ART UNIT	PAPER NUMBER
3762	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/09/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/632,347	MCGRATH, WILLIAM R.	
	Examiner	Art Unit	
	Christopher A. Flory	3762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4,6,7,9,11,12 and 15-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,6,7,9,11,12 and 15-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 2, 4, 6, 7, 9, 11, 12 and 15 are rejected under 35 U.S.C. 102(b) as anticipated by Schmidt (US Patent 6,122,537, hereinafter Schmidt'537) or, in the alternative, under 35 U.S.C. 103(a) as obvious over Schmidt'537 in view of Rostislavovich et al. (US 6,208,286, hereinafter Rostislavovich'286) or in view of Sharpe et al. (US 4,958,638, hereinafter Sharpe'638).

Schmidt'537 discloses oscillators, a transmitter & transmission antenna (Fig. 13, 2); a receiver and receiver antenna (Fig. 13, 4); a diode detector (Fig. 7) connected to receiver antennae; one common transmitting/receiving antenna (col. 6, lines 47-48); an electromagnetic signal; monitoring of amplitude changes with respect to a beating heart (col. 5, lines 17-30); the heat rate of a test person with respiration stopped (Fig. 5); the spectrum of the heart signal reflected by a breathing person (Fig. 6); transmission of a frequency in the range of 100-MHz through 10-GHz (column 3, lines 64-65); wherein the said range can still be received through dense debris (column 2, lines 1-2); a low-pass filter and high-pass filter (Figs. 8a, 8b); and the application of digital signal processing (Fig. 3).

It is noted that the respiratory and heart rate movements disclosed in Schmidt'537 are considered to be indicative of time dependent variations in the complex impedance with respect to the electrical activity of the subject's heart, because the pulse (heart rate) is indeed indicative of a heart's movement and thus tied to the electrical activity of the heart. Therefore Schmidt'537 is considered to disclose a device which includes a detector configured to extract form the reflected signal beam variations in amplitude that are indicative of time dependent variations in the complex impedance with respect to the electrical activity of the heart. Alternatively, in the same field of endeavor, Rostislavovich'286 teaches detecting a living object based on the amplitude or phase corresponding to heart rate and respiration rate when the object is motionless. Similarly in the same field of endeavor, Sharpe'638 teaches that both time domain and frequency domain techniques are both well known in the art of signal processing, but that time domain techniques are preferred as they require less processing time to obtain an initial estimate of heart rate based on amplitude measurements, and therefore characteristic impedance in this application (column 12, lines 49-52). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Schmidt'537 to include amplitude measurements in the time domain for determining heart or respiration rate (and subsequently characteristic impedance) as taught by either Rostislavovich'286 or Sharpe'638 to provide the Schmidt'537 system with the same advantages of detecting a living object when it is motionless and to shorten processing time in determining heart rate based on amplitude measurements.

Regarding claims 6 and 11, it is noted that Schmidt'537 discloses the monitoring of amplitude changes of a beating heart with respect to voltage, wherein voltage calculations are a result of Ohm's Law, V=RI, wherein with regard to oscillating signals (AC), impedance (Z) is commonly calculated in place of resistance (R), which would allow for the measurement of complex impedances with respect to a beating heart.

Regarding claim 15, Schmidt'537 discloses a remote-detection system wherein the source is configured to generate an electromagnetic signal beam at a predetermined frequency and the receiver is configured to filter the signal to remove noise as described in paragraph 4 above. Schmidt'537 also discloses amplifying the signal (Fig. 1, amplifier 8; column 7, lines 20-65).

3. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schmidt'537, or over Schmidt'537 in view Rostislavovich'286 or in view of Sharpe'638).

Regarding claims 16 and 18, Schmidt'537 discloses the invention substantially as claimed including the ability to extract information related to the complex impedance of physiological function of a subject, but does not expressly disclose that the signal processing circuitry extracts/produces an electrocardiographic waveform from the reflected electromagnetic signal beam. However, as stated by Applicant, the ability of a device to be able to penetrate the chest wall (which, when trying to monitor the heart, could be considered debris or signal-blocking material) and reflecting signal from the surface of the heart is dependent only on the frequency of the transmitted electromagnetic signal, specifically citing 20GHz as a working value. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to

use a signal frequency of 20GHz in order to provide sufficient energy in the signal to penetrate the surface of the patient's body and reflect signal from the patient's heart, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 17, Schmidt'537 discloses the invention substantially as claimed including an analog to digital converter (Fig. 1, A/D converter 9), but does not expressly disclose that the processor is a microprocessor. It is common knowledge in the art to use microprocessors in medical devices, particularly those employing A/D conversion, and therefore this limitation does not distinguish the instant application over the prior art.

Response to Arguments

4. Applicant's arguments with respect to claims 1,2,4,6,7,9,11 and 12 as being rejected under 35 U.S.C. §102(b) as anticipated by Schmidt'537 have been considered but are moot in view of the new ground(s) of rejection.

5. Applicant's arguments, see paragraph 2 of page 5, filed 27 December 2006, with respect to the objection to claim 12 have been fully considered and are persuasive. The objection to claim 12 has been withdrawn.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christopher A. Flory whose telephone number is (571) 272-6820. The examiner can normally be reached on M - F 8:30 a.m. to 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Sykes can be reached on (571) 272-4955. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Christopher A. Flory

1 February 2007

George Manuel
Primary Examiner